

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE J	PAGE OF PAGES 1   1
2. AMENDMENT/MODIFICATION NO. 0002		3. EFFECTIVE DATE 02-Jun-2006	4. REQUISITION/PURCHASE REQ. NO. SEE SCHEDULE		5. PROJECT NO. (If applicable)
6. ISSUED BY CODE NAVAL SURFACE WARFARE CENTER, CARDEROCK CODE 3352, CATHERINE GUERRA 5001 SOUTH BROAD ST. PHILADELPHIA PA 19112-1403		7. ADMINISTERED BY (If other than item 6) CODE <div style="text-align: center; font-weight: bold;">See Item 6</div>			
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)     CODE _____ FACILITY CODE _____			X 9A. AMENDMENT OF SOLICITATION NO. N65540-06-Q-5107		
			X 9B. DATED (SEE ITEM 11) 10-Mar-2006		
			10A. MOD. OF CONTRACT/ORDER NO.		
			10B. DATED (SEE ITEM 13)		
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS					
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of offer <input checked="" type="checkbox"/> is extended, <input type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required)					
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.					
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).					
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:					
D. OTHER (Specify type of modification and authority)					
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)  This amendment is issued to post the revised specifications (SPECIFICATION PSE-041, REV 5) for the above solicitation. The closing date for receipt of offers is 4:00 P.M. 19 June 2006.					
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
			TEL: _____ EMAIL: _____		
15B. CONTRACTOR/OFFEROR  _____ (Signature of person authorized to sign)	15C. DATE SIGNED  _____	16B. UNITED STATES OF AMERICA  BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED  02-Jun-2006	

EXCEPTION TO SF 30  
APPROVED BY OIRM 11-84

30-105-04

STANDARD FORM 30 (Rev. 10-83)  
Prescribed by GSA  
FAR (48 CFR) 53.243

SPECIFICATION NUMBER: PSE-041, REV. 5  
DATE: 22 MAY 2006

**PURCHASE SPECIFICATION  
FOR THE  
LAND BASED TEST SITE  
ELECTRICAL LOAD BANK SYSTEM**

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## **SECTION 1.0**

### **INTRODUCTION**

This procurement specification, and all document referred to herein, contains all of the detailed requirements for (two (2)) 2,000 KW, 0.8 PF, 450 VAC, 3 PH, 60 Hz resistive/reactive load banks with (one (1)) remote control console. These load banks will be used in a test system located outdoors on a steel platform at the Naval Surface Warfare Center, Carderock Division, Ship Service Engineering Station (NSWCCD-SSES), Philadelphia Naval Business Center, Philadelphia, PA.

#### **1.1 Applicable Documents**

The following specifications, with revisions applicable on the date specified by the contract, including standards and drawings referenced therein, form a part of this specification.

##### **A. Specifications**

NEC - National Electrical Code  
NEMA - National Electrical Manufacturers Association  
ANSI - American National Standards Institute  
ISO - International Organization for Standardization

1. No deviation from these specifications shall be made unless approved by NSWCCD-SSES.
2. All equipment and services required by these specifications and any supplements shall be considered as part of the Contractor's proposal unless specifically stated otherwise by the Contractor.

## SECTION 2.0

### SCOPE

#### 2.1 Equipment and Services to be Provided by the Contractor:

The load banks and their remote control console with software installed shall be suitable for industrial installation and shall be constructed in accordance with the best commercial practices. It is the Contractor's responsibility to furnish equipment suitable and complete in details for the services intended. The equipment shall be designed, constructed, and tested in accordance with this specification and the referenced Applicable Documents in Section 1.1. The Contractor shall be responsible for delivery of each of the following to NSWCCD-SSES in Philadelphia.

Item	Qty	Description
1	2	2000KW, .8PF, 450VAC, 3 Phase, 60HZ, Outdoor NEMA 3R Load Bank
2	1	Load Bank Remote Control Unit (NEMA 1, Indoor)
3	600 Ft (See note in Description)	Control Cable with req'd Connectors for connecting Load Banks to Remote Control Unit (Section 5.1.10.2e). Note: If multiple runs of the same type cable are utilized between Load Banks & Remote Control Unit, allowance must be made for at least a one way distance of 300 feet from each Load Bank to the Remote Control Unit.
4	1	Control System Software (Section 7.0D)
5	1	System Hardware for Control System Software as Req'd (Section 7.0E)
6	3	Release for Manufacture Preliminary Dwgs (Paper Copy) (Section 6.0, 7.0B)
7	1	Release for Manufacture Preliminary Dwgs (Electronic Copy) (Section 6.0, 7.0B)
8	3	Final Dwgs (Paper Copy) (Section 7.0A)
9	1	Final Dwgs (Electronic Copy) (Section 7.0A)
10	3	Technical Manual (Paper Copy) (Section 8.0)
11	1	Technical Manual (Electronic Copy) (Section 8.0)

2.2 Equipment and Services to be Provided by the Government:

1. The Government shall install the Load Banks & Remote Control Unit. The Government is responsible for mounting foundations and mounting bolts necessary to secure the provided equipment to site structure.
2. The Government shall install all external cabling required. The Government shall provide all external cable except as identified in item 3 above in Section 2.1.

### **SECTION 3.0**

#### **TECHNICAL PROPOSAL**

- 3.1 A technical proposal, which includes (at a minimum) the information listed below, shall be provided with the Contractor's quotation. A proposal which does not present sufficient information for the Government to confirm the capability of the Contractor or the equipment being supplied, may be rejected or otherwise determined to be technically unacceptable.
- a. The Contractor shall submit (4) copies of the technical proposal.
  - b. The Contractor shall submit a copy of their Quality Assurance System Program Plan which meets the requirements of ANSI/ISO/ASQC Q9001-2000 or equal.
  - c. The Contractor shall detail their experience in design, fabrication, and manufacture of load banks with remote control capability having similar size and requirements to the one specified herein. Please include load bank ratings, quantity of units, delivery dates, customer name, etc. for the load banks manufactured within the last three years.
  - d. The Contractor shall provide a quotation demonstrating that the equipment proposed will fully comply with this specification except any items listed by the Contractor in their technical proposal. In addition, the Contractor shall include specific information for the key items listed below. Failure of the Contractor to specifically list information about the key specification items identified below will be considered failure to meet load bank technical requirements.

**Key Specification Technical Items:**

4.1, 4.2, 4.3, 4.4, 4.7, 4.8, 4.19, 4.23, 4.24, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5, 5.1.6, 5.1.7, 5.1.8, 5.1.9, 5.1.10, 5.1.11, 5.1.12, 5.1.13, 5.1.16, 5.2.1, 5.2.2, 5.2.3, 10.5, 10.6, Figure 1

## SECTION 4.0

### GENERAL REQUIREMENTS

- 4.1 Hazardous Materials - This equipment shall not contain asbestos or mercury. Use of any known hazardous materials shall be minimized. If any hazardous material is present, the location and quantity within manufactured product shall be identified. For the purpose of this specification, hazardous material is defined as material that requires special treatment for disposal or special treatment to protect workers when handled during equipment operation or servicing in accordance with latest industry practices.
- 4.2 Offers - All offers shall include complete technical data on the load banks, including weights and dimensions.
- 4.3 Bus Bars - All bus bars in the load banks shall be copper with tin plating
- 4.4 Safety - Each load bank unit shall incorporate adequate warning labels, safety devices, barriers, coverings, and interlock features to protect personnel and itself from all hazards incident to its operation, utilization and transportation. The coverings and barriers shall not prevent suitable access to all parts subject to required cleaning, adjustment, repair and replacement during the life of the equipment.
- 4.5 Lubrication - All bearings (except sealed-for-life and self-lubricating type) shall be provided with means for lubrication. All oil holes, grease fittings and filter caps shall be easily accessible.
- 4.6 Interchangeability - All parts shall be manufactured to such standards as will permit replacement or adjustment without modification of the equipment. The same purpose components shall be interchangeable among the identical load bank units.
- 4.7 Over Voltage - Each load bank unit shall have adequate electrical / thermal characteristics / capacities to assure against degradation and damage when operating with applied over voltages of up to ten (10) percent above rated voltage. If operation with applied over voltage causes an over temperature condition, the unit shall have the necessary protection to automatically drop load.
- 4.8 Frequency Range - Each load bank unit shall have adequate characteristics to function without damage when operated within the frequency range of 60 Hz  $\pm$  5% (3 Hz).
- 4.9 Construction - Each load bank unit shall be complete so that when set up and connected to the specified source of control power, it can be used for any operation for which it was designed. Construction shall be free from any characteristics or defects that will prevent each load bank from passing any of the inspections and tests required by this specification.



- 4.10 Castings and Forgings - All castings and forging shall be free from defects, scale and mismatching. In no event will such processes as welding, peening, plugging or filling with cold solders or metallic pastes be used on castings or forgings for reclaiming any parts of the equipment.
- 4.11 Welding, Brazing, or Soldering -Welding, brazing, or soldering shall be employed only where those operations are included in fabrication of the original design. These operations shall not be employed as repair measures for defective parts.
- a. Soldering - Solder connections (electrical) shall show evidence of good workmanship. Cold solder joints, incomplete joining of solder and terminal, under or overabundance of solder or damaged insulation will be considered sufficient reason for rejection of entire unit.
- b. Flux and Cleaning Agents -Flux for soldering shall be rosin and alcohol. No acid, acid salts or acid core solder shall be used in preparation for soldering of electrical connections.
- 4.12 Fastening Devices - All screws, pins, bolts, and similar parts shall be installed with means for preventing loss of tightness. All such parts when subject to removal or adjustment will not be swagged, peened, staked, or otherwise permanently deformed. All ferrous fasteners shall be stainless steel for resistance to corrosion.
- 4.13 Surfaces - All surfaces of all castings, forgings, molded parts, stampings and welded parts shall be cleaned and free from sand, dirt, fins, spurs, scale, flux, or other harmful or extraneous materials. External surfaces shall be smooth and free from burrs that could injure personnel.
- 4.14 Dissimilar Metals - Dissimilar metals shall not be used in intimate contact with each other without suitable means for preventing electrolytic action and corrosion.
- 4.15 Painting - The load bank units shall be painted with polyurethane enamel paint with a minimum dry film thickness of 2 mils, or Government approved equal, that provides protection for severe outdoor weather conditions, including rain, snow and wind-driven moist air. Exterior paint color shall be light gray ANSI 61, or Government approved alternative.
- 4.16 Ferrous Parts – All exposed ferrous parts such as screws, bolts, nuts, washers, etc., shall be stainless steel to resist corrosion in a moist variable temperature atmosphere.
- 4.17 Aluminum Parts – All aluminum parts shall be anodized or chemically treated in accordance with good commercial practice.
- 4.18 Threads - All threaded parts shall be in commercially available sizes and thread forms.
- 4.19 Ventilation - Each load bank unit shall be adequately cooled or ventilated to prevent deterioration, degradation, or failure of the unit and any part thereof when operating at the duty cycle and under conditions specified herein, for the intended functional life of specified equipment. Moisture entering intake air ducts shall not cause deterioration or failure of any component part of the

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load bank. Electronic parts and control units shall be insulated from the heat generating load segments and ventilated as necessary to preclude damage or faulty operation.

- 4.20 Control Panels, Instruments, and Plates - All control panels, meters, and indicating plates and all words on instruction plates shall be in the English language with plain, bold-faced letters and numerals that may be easily read. Each control and instrument shall be clearly and legibly marked for function and identification with a permanent plate.
- 4.21 Materials of Construction - All materials and parts used in the manufacture and construction of each load bank unit shall be new and shall be selected for optimum compatibility with intended function and overall requirements of this specification. Mechanical, electrical and electronic components shall conform to standard engineering practices as set forth in latest applicable NEMA, NEC, ISO, and ANSI Standards. Current carrying parts shall be derated as necessary to correct for specified ambient condition. The load bank unit enclosures shall be NEMA 3R (rated for outdoor service).
- 4.22 Components - Each load bank unit shall be a functional composite of the following described components and all other components determined necessary in providing a complete unit which conforms to all requirements of this specification.
- 4.23 Connections - To load a generator, the load bank units should only require connection of:
  - a. Auxiliary & Control Power
  - b. Remote Control Unit Cables
  - c. Source
- 4.24 Control Type - Controls shall be PLC based with remote control unit able to be placed up to 300 feet from the load bank.
- 4.25 Safety Standards - Each load bank shall be manufactured to the latest industry standards listed in item 1.1A. Required warning labels shall be placed throughout the equipment.

## SECTION 5.0

### DETAILED REQUIREMENTS

#### 5.1 Components

1. General - The load bank system shall consist of two separate load bank units and one remote control unit. The load bank units will be located adjacent to one another, along their long sides. Each load bank unit shall be forced air cooled and shall have a separate enclosure. Each load bank unit shall weigh less than 21,500 pounds to facilitate transporting by large fork truck and lifting by a crane. The mounting foot print and basic outline dimensions of each load bank shall not exceed 7'-0" wide x 23'-0" long as shown in Figure 1. The load bank will be mounted on an outdoor steel platform and shall not require more than a 4'-0" clearance around the unit for maintenance purposes. Air flow shall be horizontal with inlet and exhaust air at the ends, or vertical with the inlet air at the bottom and / or lower sides and the exhaust at the top. Weather hatches / louvers shall be provided at the top for the vertical flow type and at each end for the horizontal design.

The load bank units shall be designed for continuous operation and performance out-of-doors in various weather conditions (rain, snow, direct sunlight, variable temp (0-104°F), variable humidity, etc), and dust laden environment. Periods of inactivity should not detrimentally affect the load bank units. Protection from this environment, ruggedness, and trouble-free operation with a minimum of maintenance shall be stressed in the design of the load bank units.

Each load bank shall be designed so that the load bank controls (fuses, contactors, relays, PLC, etc.) are separated from the resistive / reactive segments in the load bank.

2. Load Capacity - The load bank units will be supplied from an ungrounded (3) phase, (3) wire, 450VAC, 60HZ source. Each load bank shall provide the following minimum continuous duty, (3) phase ungrounded load capacities at 450VAC, 60HZ. The units shall each have a capacity of 2000 KW and 1500 KVAR with resolution of 1 KW and 1 KVAR.

For each single phase and three phase load capacity, the power factor shall be adjustable from 0.80 lagging through unity. All load capacities shall be available at the load terminals without the requirement to reconnect circuits within the load bank.

3. Resistance Load Segments - The resistance (KW) load segments shall employ 600 volts minimum, insulated resistive elements which are corrosion resistant with minimal resistance change from cold start to maximum operating temperature. Segments shall be designed so that an electrical fault should not cause cascading failures within the load bank. The resistance shall not differ by more than 3.0 percent from the average value of the three phases in that segment. The single phase resistors shall be arranged in balanced three phase resistive load segments. Each resistive segment shall be provided with (3) phase fusing on the line side

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of its (3) phase contactor to allow full isolation of the load segment. The overall load bank output KW tolerance shall be -0, +5% of required capacity at rated voltage.

Each resistive segment shall have a resistance to ground of not less than 50 megohms when read with a 500V megger. The resistors shall be mounted in a slide-out frame assembly to permit removal from the load bank for inspection and maintenance. Suitable provisions shall be incorporated into the load bank to permit personnel to easily disconnect all circuits from the resistors prior to removal of the assembly and to reconnect all circuits after the assembly is reinstalled. The individual resistors shall be rigidly supported in the assembly to prevent sagging and adverse movement.

There shall be no evidence of hot spots or arcing on the resistors and other electrical components during operation.

The individual resistance load segments shall be circuit arranged to permit the operator to select, apply, and remove resistive load in step increments of 1 KW from the remote control unit.

4. Reactive Load Segments - The reactance (KVAR) load segments shall employ 600 volts minimum, insulated iron core reactors with an operating hot spot temperature rise not to exceed 130 degrees centigrade at rated voltage. The reactors shall be provided with an auto thermal switch which will protect the reactors at 40 degrees centigrade or more below the temperature rating of reactor insulation system. The reactors shall be arranged in balanced three phase reactance load segments. The impedance value in each phase of each three phase load segment shall not differ by more than 5.0 percent from the average value of the three phases in that segment. Each reactive segment shall be provided with (3) phase fusing on the line side of its (3) phase contactor to allow full isolation of the load segment. The overall load bank output KVAR tolerance shall be -0, +8% of required capacity at rated voltage.

Each reactor segment shall have insulation resistance to ground of not less than 50 megohms when read with a 500 volt megger. Reactors shall be designed / arranged to prevent circulating currents and to prevent interaction between energized three phase load segments.

Each reactor shall include an integral discharge resistor. The overall operating power factor of the combined reactive segments shall not exceed .05.

The individual reactance load segments shall be circuit arranged to permit the operator to select, apply, or remove reactive load to establish any desired power factor from 0.8 lagging through unity for all resistive load increments throughout the 0-100 percent capacity of the load bank. The ratings of the reactance increments shall be in steps of 1 KVAR and shall be selectable from the remote control console.

5. Contactors - An arrangement of magnetic contactors, located in circuit between the protective devices and the load segments, shall provide "on / off" control of power to the individual resistance and reactance load

segments as initiated from the remote control unit. Each contactor shall be 600 volts minimum insulated, 3-pole, NEMA rated, and de-rated as necessary to assure continued operation and performance under all load and temperature conditions to be encountered in the load bank including over voltage at 495VAC. Each contactor will be labeled in a manner which identifies it to its applicable load segment.

6. Load Terminals - Each load bank unit will be fitted with three (3) input load terminals; A, B, and C. The terminals shall be a tin plated copper bus arrangement with provisions for connecting external load cables with standard compression lugs. Each bus shall be designed to continuously carry full rated current of the load bank circuit without exceeding safe temperatures and to accept a sufficient number of 400 MCM Cu load cables to handle full load current at 40°C ambient temperature and 75°C maximum conductor temperature.

The terminals shall be located in a enclosed watertight compartment toward the center of the load bank and/ or at the reactive end assuming the load bank reactive components are located at one end and the resistive components are at the other end. The connection compartment shall have a bolted panel or be a hinged lockable door type that provides convenient access for connecting/disconnecting load cables and safety of personnel. Cable entry shall be from bottom of compartment. Cable entry into termination compartment shall be at least 18" above load bank skid mounting location. The termination compartment bottom plate shall be made of non-magnetic metal material to allow individual single conductor cables to penetrate bottom plate without concern of induction heating.

The terminal compartment shall be constructed to be unaffected by any ambient conditions stated in paragraph 5.1.1.

7. Cooling Fan - Each load bank unit shall be cooled as necessary by an electric motor(s) driven, direct coupled fan(s). Fan motors ½ HP or larger shall be three phase while smaller fan motors may be single phase. The motors shall be properly rated for their service environment. The motor(s) HP rating shall be large enough so as not to be overloaded under any condition of load bank operation and  $\pm 10$  percent variation in motor rated voltage or  $\pm 5$  percent variation in frequency.

Directional arrows, on the outside of the load bank unit enclosure, shall indicate correct fan rotation and correct air flow. The temperature of the exhaust air, emitting from the discharge of each load bank, shall not exceed the long term capability of all materials exposed to such temperature under all ambient and operating conditions. Moisture entering intake air ducts shall not cause deterioration or failure of any component part of the load bank unit, nor shall moisture entering the air ducts cause any adverse affects to the main bus connection terminals in the terminal compartment.

The fan motor(s) shall be designed and circuit arranged to operate from 460VAC auxiliary power (section 5.1.9) within the load bank unit. The motor circuit(s) shall include short circuit protection (65KAIC minimum) and a 3-pole magnetic starter(s) with running over current protection for each motor phase in accordance with NEC requirements. The fan

motor(s) shall be positioned in its load bank so as not to be subjected to excessive temperatures. The fan motor shall be controlled from the remote control unit. The load bank control section containing fuses, contactors, etc. shall be installed in a compartment within the load bank unit separated from all load segments and insulated from the heat generating load segments and ventilated as necessary to preclude damage or faulty operation.

8. Space Heaters - Each load bank unit shall include electric heaters of appropriate wattage, properly installed to protect the electrical control components in the control section and load segments in the load section of the load bank from the adverse effects of moisture and condensation. The heaters shall be wired to operate from a 3 phase power source within the load bank unit control section. The heaters shall also be thermostatically controlled by a temperature sensor as necessary to guarantee that heat generated will not reach temperatures detrimental to any part of the load bank under all ambient conditions. An indicating light shall also be installed to indicate when the heater circuit is energized. The heater power shall be locally isolatable via a circuit breaker or fuse located within the control section of the load bank.
9. Auxiliaries & Control Power - Each load bank unit shall be designed for a Government provided source of 460 volts,  $\pm 5$  percent, 3 phase, 3 wire, 60 hertz input power for operation of the fans, space heaters, load contactors and all associated control and indicator functions. Nominal rated voltage on all contactor coils shall not exceed 125 volts.

It is the Contractor's responsibility to distribute this auxiliary power within the load bank to provide the required power and provide the required component protection. Design provided shall consider outdoor environmental factors.

## 10. Controls

- 10.1. Remote Control Unit, General - The remote control unit shall be able to monitor and operate both load banks at the same time. A single controller for both load banks or a separate controller for each load bank may be utilized. If two separate controllers are utilized, they should be mounted into a single remote control unit which is wall or floor mountable. The overall dimensions of the remote control unit shall be no greater than 24 inches wide x 30 inches deep X 72 inches high.

- 10.2. Remote Control Unit, Operational - The load bank remote control unit shall contain the following controls, indicators, and readouts or equal:

- a. Control Requirements

COOLING FAN ON/OFF – This control initiates the fan motor start / stop circuits.

LOAD KW ADJUSTMENT - This control allows the operator to select the required resistive load in continuous steps of 1 KW

over the entire range of 0 to 2000 KW.

**LOAD KVAR ADJUSTMENT** - This control allows the operator to select the required reactive load in continuous steps of 1 KVAR over the entire range of 0 to 1500 KVAR.

**LOAD CHANGE** - This control is used to change the present load to the new load as selected (ie. when the load setting is changed, activating the LOAD CHANGE switch will change the load on the system from the previous setting directly to the new setting without totally unloading the system during the process). Note: It is desirable to have the ability to select the load bank segments that will be utilized for a particular load bank run in case there are certain load bank segments that have been isolated for maintenance prior to the run. Provide the segment selection feature as an optional cost if it is not part of the standard product line.

**COMPLETE SYSTEM UNLOAD** - This control shall remove any load that is currently applied.

b. Indications

**FAN ON** - This Indicator acknowledges that the motor logic has initiated fan starting.

**AUXILIARY & CONTROL POWER ON** - Indicates whether or not the main source of power is available for fans, heaters, and control circuits at the load bank.

**COOLING AIR FAILURE** – Alarm for insufficient cooling air flow within the load bank to support operations.

**KW / KVAR SEGMENT HIGH TEMPERATURE** – Alarm for over temperature within the load segment area of the load bank.

**LOAD SEGMENTS INDICATION** – Shows the status of all load segment use.

c. Display

All status and alarm indications shall be continuously displayed and shall be visible from a distance of six linear feet.

KW / KVAR selections and actual readings shall be displayed.

A systematic approach for the Display shall be employed to clearly identify all indications and alarms.

d. Power

The load bank remote control unit shall be powered locally through a single phase 15A or 20A, 115 VAC 60 Hz service or may be powered from the auxiliary power supplied to each load bank unit via its remote control cable. If locally powered, power shall enter the remote control unit through a single three conductor cable with a 12 foot, three prong male plug (NEMA 5-15P) on the source end suitable for a standard 115 VAC wall receptacle.

e. Enclosure Type / Communications

The load bank remote control unit shall be contained in a NEMA 1 or better rated enclosure.

The load bank remote control unit shall interface with the controller mounted within each load bank. Serial communications should occur between the remote control unit and each load bank unless the Contractor provides other methods that the Government approves.

The load bank status shall be continuously monitored through the remote control unit. If a fault is detected, the load bank protection system shall immediately respond by removing the required load from the affected load bank. The remote control unit shall receive audible and visual notification of the fault or abnormal condition and the remote control unit shall display and allow acknowledging any alarms.

A total of at least 600 continuous feet (see Section 2.1, item 3 note) of 600V, type TC, UV resistant, outdoor rated (wet or dry location) control cable shall be provided for connecting the load bank control unit to each of the load banks. A sufficient number of connectors suitable for mating with the receptacles on the load banks and the load bank control unit shall also be included. The connectors shall not be mated to the control cables. The connectors shall be multi-pin, quick disconnect, polarized type (DB9, DB25, or equal).

11. Protective Features - The load bank units shall include the following minimum protective features:

- a. KW/KVAR Segment High Temperature – High temperature detectors shall function to remove the applied load and provide a "HIGH TEMPERATURE ALARM" on the remote control unit in the event of over temperature in the exhaust air stream. Four detectors, one physically located in each quadrant of the exhaust air stream within the load bank unit, shall be furnished. The circuitry of the detectors shall independently cause the required function. Each detector shall be set to activate before temperatures in the load bank unit exceed safe levels, and before equipment damage can occur.



- b. Cooling Air Flow - A differential pressure switch shall sense the cooling air stream velocity pressure and compare it to ambient static pressure. It shall function to remove the load and provide a "COOLING AIR FAILURE ALARM" on the remote control unit in the event air flow through the load bank is reversed, interrupted, or reduced below a safe value.
  - c. Interlocks - A network of interlock switches on the load bank unit shall be provided as necessary to insure safe, reliable operation. Such interlocks could include switches to monitor doors, louvers, fan motor circuits, etc. to remove load or shutdown the load bank for abnormal conditions. The remote control unit shall receive and display an alarm for any abnormal condition resulting from the interlocks provided.
  - d. Control Power Under Voltage Protection - An under voltage release circuit shall automatically function to remove the load in the event that control voltage within the load bank is interrupted or is reduced to a level which prevents the contactors from being opened by the remote control unit. The protective circuit shall continue to trip open the contactors until the problem is corrected and normal on-off control restored.
  - e. Fuses / Circuit Breakers- A complete set of fuses shall be provided for each contactor. Time-current characteristics of protective devices, when connected in series with other protective devices, shall be coordinated to the degree possible for proper operation. Fuses & Circuit Breakers shall have a voltage rating not less than the applicable circuit voltage. Interrupting rating of protective devices shall be in accordance with the National Electric Code (2005). The Load Bank Segments shall be protected with fuses rated at 200,000 AIC. The Auxiliary Power / Control Power protective devices shall be rated for 65,000 AIC where utilized in the 460V supply circuit.
  - f. Labels - The exterior of the load bank shall have appropriate warning/caution statements on each door and access panel. When the doors and access panels are opened, appropriate danger signs shall be clearly visible.
12. Wiring - Inter-unit connecting wiring within each load bank unit will be suitably rated for all service conditions encountered. There shall be no splicing between termination points. Wiring shall be installed in a manner which prevents undue stress in cable forms, wires and connections. Where wires or cables must pass through a frame, by irregular surfaces, sharp edges, or heat dissipating parts, they shall be routed and protected with suitable means to prevent possible damage or degradation during the life of the equipment.
13. Electrical Connections - All electrical connections within each load bank unit shall be complete and shall be made via terminals on the components, terminal/circuit boards, receptacles, and bussing. Connections/terminals shall be adequately supported and spaced without

dependence upon the wiring in the components and circuitry for rigidity. Bussing shall be additionally supported and braced as necessary to assure withstanding the distorting forces associated with available short-circuit currents.

Proper identification of wiring, bussing, terminals and circuits for function, polarity, phasing, etc., shall be adhered to throughout each load bank unit. Identification shall be in the form of wire markers, color coding, permanently engraved plates, or permanent markings on the devices.

Adequate spacing shall be maintained throughout to avoid excessive bending of cabling and wiring, to maintain adequate separation and creepage distances between electrical potentials and between these potentials and ground, and to permit ease in connecting and disconnecting wiring and cabling during troubleshooting and repair.

14. Solid State Components - Solid-state design shall be employed throughout for electrical components as far as practicable. Each solid-state device that is selected and installed shall have characteristics and durability ratings compatible with its intended function to assure long life and reliability.
15. Receptacles - A watertight compartment on each load bank enclosure shall be provided with a receptacle for connecting the remote control cables. The receptacle shall be the multi-pin, quick disconnect, polarized type designed to mate to the corresponding plug on the applicable control cable. The receptacle shall be identified by function.
16. Grounding - The enclosure shall include a ground lug or stud of appropriate size to permit grounding of the load bank unit adjacent to the load terminal compartment enclosure to ensure personnel safety IAW the NEC (2005).

## 5.2 Enclosure

1. General - All component parts and wiring of each load bank unit, excluding the remote control unit, shall be properly installed in a free-standing, weather-resistant, transportable, NEMA 3R steel enclosure(s). The enclosure(s) shall be attached to a rigid structural steel skid so that it can be safely lifted and transported from each side by forklift truck as well by crane.

The enclosure(s) shall include a solid floor and roof deck without apertures except as necessary for intake & exhaust air.

2. Doors and Covers - The entire sides of each load bank enclosure shall be fitted with hinged doors or bolted panels to permit full access to the installed equipment for routine inspection, in-place maintenance, troubleshooting, and removal for overhaul/repair.

Each door/cover shall be designed and gasketed to protect the inside of the enclosure/compartment against the outside environment.

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3. Openings & Louvers – Load bank unit intake air openings shall be designed to preclude objects greater than 1/2" from entering. Weather hatches / louvers shall be provided at the top for the vertical flow type and at each end for horizontal flow type. The hatches / louvers shall open for load bank operation and close after the load bank is shutdown. They shall be designed to withstand the service environment and insure trouble free operation with minimal maintenance.
4. Identification Plates - A corrosive-resistant, metal nameplate with permanently inscribed legend shall be affixed to the outside of each load bank enclosure. The nameplate will contain as a minimum:

Equipment Nomenclature

Manufacturer's Name, Model and Serial Number

Electric Power Characteristics and Capacities

Contract Number and Date

5. Warning / Instruction Plates - Non-corrosive plates with information permanently inscribed thereon shall be properly affixed to each load bank unit to warn and otherwise instruct personnel of potential hazards incident to operation, utilization and maintenance.

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## **SECTION 6.0**

### **MANUFACTURING AUTHORIZATION**

Release to manufacture is withheld until Preliminary Drawings are approved or approved with comments. Preliminary drawings shall consist of complete electrical schematics, load bank unit and remote control unit drawings showing dimensions and weights, and all other drawings necessary for the buyer to determine, with reasonable certainty, whether the manufactured items will meet the specifications. Release to manufacture will be specifically stated in a letter to the vendor. After release for manufacture, the vendor should contact NSWCCD-SSES if there are any questions that may hold up manufacture. Preliminary Drawings shall be forwarded for approval to the address shown below:

Commander  
Naval Surface Warfare Center, Carderock Division  
Naval Business Center Bldg 542  
Philadelphia, PA 19112-5083  
Attention: Toni Checchio, Code 9345

## **SECTION 7.0**

### **DRAWINGS**

#### **A. General**

1. The vendor shall provide, for installation and operation purposes, three complete sets of assembly, detail, and electrical schematic & wiring dwgs in paper format. The drawings shall be clear, sharp and understandable. One set of AutoCAD files or customer approved equal shall also be supplied. The drawings shall indicate the material specifications for each piece and contain sufficient information in the form of dimensions, notes, clearances, etc., in order to enable the equipment to be installed, repaired and maintained after termination of the guarantee period.
2. Preliminary information and foundation drawings shall be provided for all equipment that will be installed on structural foundations. These drawings should include the following information as applicable:
  - a. Center of gravity
  - b. Overall dimensions
  - c. Foundation bolting & footprint
  - d. Weight, estimated
  - e. Size and locations of electrical and pipe connections
  - f. Space required for overhaul of internal components
  - g. Certification data sheet which lists major component design ratings and nameplate information.
  - h. Technical information regarding hardware & software to be utilized for remote control system as required per Section 7.0D & 7.0E.
3. Wiring diagrams (point to point) shall be drawn to show the electrical components in the position that they will be viewed during maintenance work (i.e. doors/panels open or removed).

#### **B. Preliminary Drawings**

The vendor shall submit preliminary drawings for review. Three sets of paper drawings and one set of AutoCAD files or customer approved equal with the information outlined in Section 7.0 A shall be forwarded within 30 days of award of the contract to:

Commander  
Naval Surface Warfare Center, Carderock Division  
Naval Business Center Bldg 542  
Philadelphia, PA 19112-5083  
Attention: Toni Checchio, Code 9345

C. Final Drawings

Final drawings shall consist of three sets of paper drawings and one set of AutoCAD files or customer approved equal. Final drawings must incorporate changes made from NSWCCD-SSSES comments on the preliminary drawings. These drawings shall be shipped with the load banks to the address shown below item 7.0E.

D. Software

A complete set of control system software and related documentation shall be supplied for each load bank purchased. These shall be shipped with the load banks to the address shown below item 7.0E.

E. Hardware

Any appropriate hardware devices and their documentation to install the software shall be supplied for each load bank purchased. These shall be shipped with the load banks to the address listed below.

Commander  
Naval Surface Warfare Center, Carderock Division  
Naval Business Center Bldg 542  
Philadelphia, PA 19112-5083  
Attention: Toni Checchio, Code 9345

## SECTION 8.0

### TECHNICAL MANUAL

#### A. Validation

1. General - The Contractor is responsible for the technical accuracy and adequacy of the technical manual to be furnished. Three paper copies and one electronic copy are required. The Contractor shall furnish certification that the manuals have been checked and validated against the equipment in accordance with the following requirements:
  - a. Assembly / Disassembly - Assure procedures and drawings in the manual are correct by actual performance of the evolutions. Disassembly procedures should be essentially the reverse of the assembly; assure by references to and comparison with assembly. If equipment is already assembled, reverse the order of the above procedure.
  - b. Maintenance
    - (1) Assure that maintenance procedures described in the manual are compatible with the internal accessibility of the equipment by reviewing the drawings in the manual and by step-by-step comparison of drawings with textual instructions.
    - (2) Using the equipment, accomplish maintenance tests, adjustments and calibrations during tests covered in paragraph C. below.
  - c. By physical performance and demonstration using the actual equipment, assure the following:
    - (1) Description and operating instructions for control devices and indicators are correct.
    - (2) Accuracy and adequacy of step-by-step equipment/system operating procedures described in the manual including:
      - (a) Starting
      - (b) Securing
      - (c) Operation under interfering conditions, including operation during emergency conditions when practical.
2. It is realized that there will be cases when validation of some procedure cannot be accomplished at the Contractor's facility, or that it will be impracticable to do so due to the nature of the equipment. In these cases, the Contractor's quotation shall specify the procedures which will not be validated at his facility, and shall provide justification at time of bidding.

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3. Any discrepancies found in the manual will be forwarded to the Contractor for corrective action and revalidation as applicable at the Contractor's expense.
4. In addition, technical manuals shall be provided with:
  - a. Photographs of the control panel showing external instrumentation and internal equipment arrangement.
  - b. All parts, other than standard washers and nuts and frame structure, shall be identified with a piece number.
  - c. All spare parts shall be distinctively identified.
5. The Technical Manual shall also contain documentation of Load Bank Testing as described in Section 10.5a, b, c, & d.



## **SECTION 9.0**

### **SPARE PARTS AND SPECIAL TOOLS**

#### **A. General**

1. The Contractor shall provide with his proposal an itemized and priced list of all spare parts and tools he proposes to provide. The government reserves the right to order any or all of the proposed spare parts listed. The prices set forth in the aforesaid list of repair parts furnished by the Contractor will not be used in evaluating offers. A listing of the spare parts and special tools provided shall be included in the technical manual.
2. Spare parts and special tools shall consist of those items which in the opinion of the vendor will be required to maintain and/or overhaul the equipment to assure its operating condition for at least 10,000 hours of operation. The spare parts and special tools shall consist of, but are not restricted to, such items as:
  - a. For the motors: bearings, shaft seals, brushes and fan belts.
  - b. For controllers, pushbuttons, etc: a replacement set of contacts, springs, and overload heaters, shunt coils, resistor units, control circuit transformers and indicating light potential transformers.
  - c. Spare indicators and sensors for instrumentation.
  - d. Spare fuses.

## SECTION 10.0

### **QUALITY ASSURANCE / TESTING PROVISIONS / WARRANTY**

1. **Responsibility for Inspection** - The Contractor shall be responsible for the performance of all inspection requirements as specified herein. The Contractor may utilize his own facility or any other commercial facility acceptable to the Purchaser. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements. The Government shall be notified regarding the testing schedule (2) weeks in advance so the Government can witness testing if desired.
2. **Measuring and Test Equipment** - The Contractor shall provide and maintain gages and other measuring and testing devices necessary to assure that supplies conform to the technical requirements. In order to assure continued accuracy, these devices shall be calibrated at established intervals against certified standards which are traceable to national standards. If production tooling, such as jigs, fixtures, templates and patterns are used as a media of inspection, such devices shall also be tested for accuracy at established intervals. Inspection equipment shall be calibrated to traceable standards.

When required, the Contractor's measuring and testing equipment shall be made available for use by the government representative to determine conformance of product with contract requirements. In addition, if conditions warrant, Contractor's personnel shall be made available for operation of such devices and for verification of their accuracy and condition.

3. **Contractors Inspection System** - The Contractor shall provide and maintain a quality assurance system acceptable to the government for the supplies covered by this contract. The Contractors quality assurance manual shall be made available for government inspection on request.
4. **Examination at Origin** - The equipment offered for delivery shall be examined for design, construction, components, electrical equipment and workmanship to determine conformance with the requirements of this specification. The fit of parts shall be observed with particular reference to the interchangeability of such as are likely to require replacement.
5. **Test at Origin** - The Contractor shall be responsible for performing the following tests on the completed units being offered for delivery. Responsibility for the safety of the equipment during these tests remains solely with the Contractor. Additional tests may be performed as part of the Contractor's QA program.

Note: The tests listed below in section 10.5.b, c, & d shall include utilization of the remote control console that is being purchased with the load banks. All test results in section 10.5 shall be documented and included in the Technical Manual.

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- a. Insulation Test – Each load bank load circuit shall be subjected to hipot testing and each load bank load circuit shall also be subjected to megger tests using a 500 volt megger and with all contactors closed at the same time to determine the insulation resistance between current carrying members and ground. The resistance to ground shall not be less than 10 megohms at any point tested when heated from normal operation. Tests shall be conducted prior to and at the conclusion of the power tests. In addition, the load bank shall be mildly sprayed with city water after power test and cool down and then another megger test shall be performed 15 minutes after spraying to verify minimum megger reading can still be achieved.

Additional insulation tests (megger and / or high pot tests) are required to be conducted on components operating at greater than 120vac (ie. blower and auxiliary power components).

- b. Operational Test - Each load bank unit shall be energized at no load and all controls and indicator functions checked for proper operation.
- c. Power Tests
- (1) 60 Hertz Test - Each load bank unit shall be energized with 450 volts, three phase, 60 Hertz applied to its input load terminals. The load contactors shall be cycled by opening and closing under normal load conditions of voltage and current. Each device shall be cycled not less than 25 times. The load bank unit shall then be operated at 450 volts full load capacity for a continuous four hour period. Immediately following this period, each device shall again be cycled not less than 10 times.
- (2) Results - The results of observations and measurements made during and at the conclusion of each power test shall confirm in each load bank unit:
- (a) No evidence of heat damage or deterioration
  - (b) No evidence of sagging, distortion, hot spots or arcing on the resistors
  - (c) No trip-out or faulty operation of the load bank
  - (d) No evidence of excessive pitting, contact bounce, contact chatter, and failure to promptly extinguish the arc
  - (e) Minimum change in load segment characteristics from cold to maximum operating temperature
  - (f) Load capacities, increment step loading, and adjustment of power factor conform to stated requirements.
  - (g) KW and KVAR readings on the remote console are accurate and comply with requirements.

- d. Protective Features Test - Each load bank unit shall be energized and all protective features tested for proper operation. The tests on each feature which functions to trip open the contactors shall be accomplished in a manner which assures that it is the feature being tested which actually trips the contactors under the simulated condition.
  - e. Progress Report - The supplier shall provide monthly reports to NSWCCD-SSES describing work accomplished during the previous month, work planned for the following month, construction milestones with estimated dates and actual dates, and estimated shipping dates for all items due under the contract. The report shall also include an explanation of any problems or delays encountered during performance of the contract.
6. Warranty of Load Banks – All Load Bank Equipment purchased shall be free of defects in workmanship and material. The warranty shall cover a minimum period of one year from date of installation or 18 months from time of delivery. Warranty shall include replacement parts and labor as needed. Note: Failed load bank megger readings (<10 meg ohms insulation resistance with all contactors closed under various weather conditions will be considered a warranty issue.)

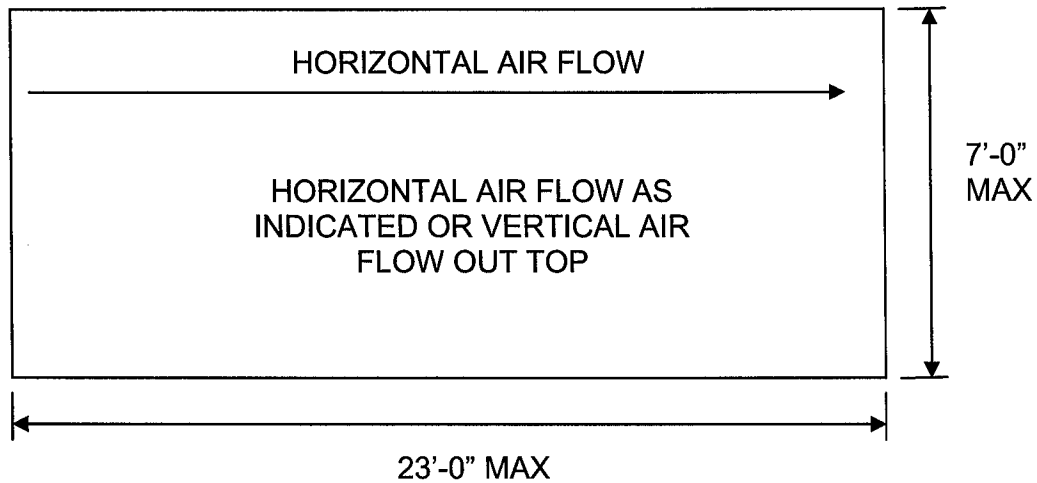
**SECTION 11.0**

**PACKING, MARKING, AND DELIVERY**

- A. The Contractor is responsible for the equipment until the delivery / receipt of the equipment by the Government.
- B. Equipment shall be preserved, packaged, and packed for shipment in a manner which will ensure acceptance and safe delivery to destination. Container shall comply with "Uniform Freight Classification Rules". Marking shall be in accordance with MIL-STD-129.
- C. The equipment shall be preserved in accordance with manufacturer's best commercial practices and shall be capable of withstanding indoor storage condition for a period of 12 months. Instructions for removal of preservation from the equipment and the name of a suitable solvent to be used (if applicable) shall be provided to the purchaser and shall be packed with the equipment.
- D. Each item shall be marked with the following information:
  - 1. Contract Number
  - 2. Applicable Contract Item Number
  - 3. Purchase Specification Number PSE-041
- E. All equipment shall be delivered to the address provided below within 140 days after contract award assuming that preliminary drawings are reviewed and approved by NSWCCD-SSES within 14 days of receipt.

Commander  
Naval Surface Warfare Center, Carderock Division  
Naval Business Center Bldg 542  
Philadelphia, PA 19112-5083  
Attention: Toni Checchio, Code 9345

**FIGURE 1**



**LOAD BANK PLAN VIEW (Mounting Footprint)**

**Notes:**

1. The mounting footprint is the maximum size allowed where the load bank will be bolted to the customer's existing steel platform.
2. See Section 5.1.1 for overall maximum dimensions and other dimensional requirements of the load bank.
3. The bottom of the load bank bolt on panels or doors shall be elevated at least 2" from the bottom of the load bank to assure that the doors will not hit the existing platform grating when opening.